DYNAMIC EXOSKELETAL ORTHOSIS

RELATED APPLICATION

[0001] This application claims priority to U.S. Provisional Patent Application Ser. No. 61/518,801 filed in the U.S. Patent and Trademark Office on Apr. 20, 2011, the entirety of which is incorporated herein by reference.

FIELD OF INVENTION

[0002] The present invention is directed to an ankle foot orthosis or brace, in particular to a dynamic exoskeletal orthosis.

BACKGROUND

[0003] Orthotics are devices that are made to correct or maintain alignment of different parts of the body, hence the name "braces."

[0004] An ankle foot orthosis (AFO) supports the joints of the foot, as well as the ankle. These devices can be used to protect, correct or limit motion at the joints by supporting a person's limb that has suffered from loss of strength or alignment due to disease or trauma. AFOs can be a solid design at the ankle with no motion allowed, or with joints to allow certain degrees of motion.

[0005] Historically, bracing options for those with pain/weakness/decreased range of motion about the ankle have been severely limited. The most common types of bracing either provided adequate strength compensation in the instance of an isolated peroneal neuropathy or were designed with very stiff orthotic materials that essentially immobilized the ankle and did not allow a more normal gait or higher level activities.

SUMMARY OF INVENTION

[0006] According to an aspect of the present invention, an exoskeletal orthosis comprises a proximal cuff comprising a hinge along an upper edge of the cuff; an ankle section/footplate; and at least one posterior strut connecting the proximal cuff to the ankle section/footplate.

[0007] According to another aspect of the present invention an orthosis comprises a proximal cuff comprising at least one hinge along an upper edge of the cuff; an ankle section/footplate; and at least one posterior strut attached at a proximal end to the proximal cuff and attached at a distal end to the ankle section/footplate. The ankle section/footplate comprises a suprarnalleolar ankle section having a lateral wing and a footplate section extending to the tips of a user's toes and having an arch.

[0008] According to another aspect of the invention, a method of treating an injury is provided comprising fitting an individual having an injury with an orthosis according to the present invention and placing the individual's foot with the attached orthosis inside a shoe or boot.

[0009] An advantage of the present invention is that the dynamic exoskeletal orthosis allows greater ability to walk and run despite severe lower extremity physical impairments.

[0010] Another advantage of the present invention is that the dynamic exoskeletal orthosis allows for early walking post-injury to high level activities with the same orthosis.

[0011] Yet another advantage of the present invention is that the dynamic exoskeletal orthosis may be lightweight, durable (tolerates impact of running with a ruck sack, for example, up to about 120 lbs.), and may be used in regular shoes and military boots.

[0012] As used herein "substantially", "relatively", "generally", "about", and "approximately" are relative modifiers intended to indicate permissible variation from the characteristic so modified. They are not intended to be limited to the absolute value or characteristic which it modifies but rather approaching or approximating such a physical or functional characteristic.

[0013] In this detailed description, references to "one embodiment", "an embodiment", or "in embodiments" mean that the feature being referred to is included in at least one embodiment of the invention. Moreover, separate references to "one embodiment", "an embodiment", or "embodiments" do not necessarily refer to the same embodiment; however, neither are such embodiments mutually exclusive, unless so stated, and except as will be readily apparent to those skilled in the art. Thus, the invention can include any variety of combinations and/or integrations of the embodiments described herein.

BRIEF DESCRIPTION OF THE DRAWINGS

[0014] FIG. **1** is a side view of a dynamic exoskeletal orthosis according to an embodiment of the present invention.

[0015] FIG. **2** is a view of a proximal cuff of a dynamic exoskeletal orthosis according to an embodiment of the present invention.

[0016] FIG. **3** is a view of a dynamic exoskeletal having a dual strut configuration according to another embodiment of the present invention.

[0017] FIG. **4** is a rear view of a dynamic exoskeletal orthosis showing a posterior strut according to an embodiment of the present invention.

[0018] FIG. **5** is a view of a dynamic exoskeletal orthosis attached to a person's leg and foot.

[0019] FIG. **6***a* is a side view of a partial dynamic exoskeletal orthosis according to an embodiment of the present invention.

[0020] FIG. **6***b* is a top view of the partial dynamic exoskeletal orthosis of FIG. **6***a*.

[0021] FIG. **7** is a side view of a dynamic exoskeletal orthosis according to another embodiment of the present invention.

[0022] FIG. **8** is a side view of a dynamic knee ankle foot exoskeletal orthosis according to an embodiment of the present invention.

[0023] FIG. **9** is a rear view of a dynamic knee ankle foot exoskeletal orthosis according to an embodiment of the present invention.

[0024] Given the following enabling description of the drawings, the methods and apparatus should become evident to a person of ordinary skill in the art.

DETAILED DESCRIPTION OF INVENTION

[0025] The orthosis of the present invention is designed to allow walking and running for individuals or patients with severe injury to the lower limb that causes reduced ankle range of motion, weakness, and pain. The orthosis allows for a range of activities including, but not limited to, early ambulation during the early post-injury phase, agility and impact activities, running, sprinting, and deploying with a military unit.